Welcome

- Snowmass background
- Snowmass2021 organization
- Notable dates (for now)
- Letters of Interest (due Aug 31)
- FAQs

Snowmass and P5

- Major Initiative prioritization in the HEP community proceeds in 2 steps:
  - **Snowmass**: A series of workshops culminating in a written proceeding, collecting broad community input (2013 Proceeding)
    - Organized by the APS Division of Particles & Fields (DPF)
    - 2021 Snowmass web site: see esp. Cosmic Frontier WGs
  - **P5** (Particle Physics Project Prioritization Panel)
    - Subpanel of High Energy Physics Advisory Panel (HEPAP)
      - HEPAP: Advisory panel to DOE Office of HEP and NSF Math. & Physical Science Directorate
    - P5 issues a report with priorities in different budget scenarios, along with a timeline of construction & operation (Building for Discovery: P5 2014 report, exec summary)
- The 2014 P5 report has been highly successful in that the advice has been followed (reasonably) closely, and the major new initiatives included are either immanent or under way.

Slides from Katrin in DESC presentation

2014 P5 Report: Construction & Physics Timeline

- Projects listed here are all >50M$. A small projects portfolio was also recommended, plus 29 Recommendations.
- Note that CMB-S4 was strongly recommended: HEP science case & community enthusiasm were present
- Rubin Obs included with operations to 2032 - highlighting our strong science case still important!
- Note: no Dark Energy/Cosmology project listed post 2032

Slides from Katrin in DESC presentation

Overall Snowmass Structure

- Snowmass Frontiers
  - Energy Frontier
  - Neutrino Physics Frontier
  - Rare Processes and Precision
  - **Cosmic Frontier** →
  - Theory Frontier
  - Accelerator Frontier
  - Instrumentation Frontier
  - Computational Frontier
  - Underground Facilities
  - Community Engagement Frontier

- Each Frontier has subgroups (7 on average)

- CF1. Dark Matter: Particle-like
- CF2. Dark Matter: Wave-like
- CF3. Dark Matter: Cosmic Probes
- **CF4. Dark Energy and Cosmic Acceleration: The Modern Universe**
- **CF5. Dark Energy and Cosmic Acceleration: Cosmic Dawn and Before**
- **CF6. Dark Energy and Cosmic Acceleration: Complementary Probes and New Facilities**
- **CF7. Cosmic Probes of Fundamental Physics**

CF4. Dark Energy and Cosmic Acceleration: The Modern Universe

This group covers cosmic probes of cosmology in the Modern Universe, when galaxies are fully formed. These probes include galaxy clusters, galaxy clustering, redshift space distortions, gravitational lensing, baryonic acoustic oscillations, supernovae and more. Spectroscopic, broad-band and multi-wavelength surveys are examples of experiments that will be primarily discussed in this working group. Other examples include projects involving CMB, 21cm, and gravitational wave observations.

Conveners: Jeffrey Newman (Pittsburgh), Masao Sako (Penn), Anže Slosar (BNL)

CF5. Dark Energy and Cosmic Acceleration: Cosmic Dawn and Before

This group covers cosmic probes of cosmology in the early Universe from Inflation Era through the Cosmic Dawn. Subtopics include: growth of structure probes (e.g. 21cm power spectrum in the dark ages), probes of expansion history (e.g. BAO with black hole mergers, CMB), primordial non-gaussianity and inflation. High-z gravitational wave observatories, 21cm and CMB projects are examples of experiments expected to be primarily discussed here. Overlaps with the previous section are expected.

Conveners: Clarence Chang (ANL), Laura Newburgh (Yale), Deirdre Shoemaker (UTA)

CF6. Dark Energy and Cosmic Acceleration: Complementarity of Probes and New Facilities

This group covers the connections between probes across multiple axes including combined probes across the early/late time regimes. This group also houses submissions that wish to provide an overview of a new facility. The term “new facilities” here refers specifically to facilities that are not already funded by DOE. Submission to CF6 would include a description of the potential DOE scope (e.g. construction of spectrographs), in order to be included in the future P5 ranking process, and would likely be accompanied by submission to CF3/4/5/7, where the target science goals are described in more detail. For new facilities that already have white papers submitted to Astro2020 (e.g. MSE), an LOI submission linking to the Astro2020 white paper could provide the majority of the information.

Conveners: Chihway Chang (Chicago), Brenna Flaugher (Fermilab), David Schlegel (LBNL)

CF7. Cosmic Probes of Fundamental Physics

CF7 covers cosmic probes of fundamental physics topics beyond Dark Matter and Dark Energy using gravitational waves, cosmic rays, gamma rays, and neutrinos, as well as their combined studies to facilitate the multi-messenger science. Some Examples: This includes measurements of neutrino properties from cosmology (overlap with NF 5), tests of general relativity, emergent spacetime (overlap with CF2, 3, 5), black hole information with gravitational waves, the tension between local distance ladder measurements and cosmic microwave background estimates of the Hubble constant, equation of state of dense nuclear matter and hadron-quark gluon phase transitions, particle acceleration in astrophysical environments, bread-and-butter perturbative QCD and hadronic physics of extensive air showers, Lorentz Invariance Violation, search for evaporating primordial black holes, and exotic particles such as SUSY q-balls and axions.

Conveners: Rana Adhikari (Caltech), Luis Anchordoqui (CUNY), Ke Fang (UW-Madison), B.S. Sathyaprakash (Penn State), Kirsten Tollefson (MSU)

Letters of Interest

Letters of Interest (LoIs) are informal documents intended to be useful in the first stages of the Snowmass study. They will help Snowmass conveners to prepare the Snowmass Community Planning Meeting that will take place on October 5-8, 2020 virtually. LoIs could include opinions, interests and proposals that could further be studied. They should contain a maximum of 2 pages of text, plus relevant bibliography. There is no further requirement on the format. Please make these as simple and easy to read as possible. Authors of the letters are welcome to make a full writeup for their work as a contributed paper and submit it to the Snowmass proceedings. However, a contributed paper is not required.

Upload LoIs via: https://snowmass21.org/loi

Timeline

- **August 31, 2020:** deadline for submitting Letter of Interest (LOI), in order to organize Snowmass process (collect all interesting ideas)
- **October 5-9, 2020:** Community Planning Meeting (virtual)
  - update progress and organize activity leading up to snowmass meeting
  - LoIs help inform the organization of this meeting.
- **July 11-20, 2021:** Snowmass meeting (write final snowmass report)
- **July 31, 2021:** deadline for submitting white papers from individual groups

- If you plan on writing a white paper it would be best to submit an LOI
- The final report hopefully will be a collaborative effort from the whole group

Frequently asked questions

- Resubmit from Astro2020?
  - Yes, you can submit the same idea/project/facility. Consider updating the science case and facility descriptions in the LoI's
- Participate if not in US?
  - Yes - submit an LoI. Snowmass is a science-driven process.
- What is the scope?
  - Cosmology and fundamental physics are more natural (and thus easier to support) for DOE; astronomy and astrophysics less so - would have to have a lot of community support

Frequently asked questions

- If I submit an LoI, do I have to contribute a white paper?
  - No.
- Can I contribute a white paper, if I don't provide an LoI?
  - Yes. But, LoIs will be used to organize and structure the process.
- How developed should I make my LOI?
  - The LoI is 2 pages and should be as simple and easy to read as possible.
  - LoIs provide input on topics for organizing meetings and discussions.
- Can I submit an LoI to multiple "Frontiers"
  - Yes. Indicate which "Frontier" is the primary
- Can I submit an LoI to multiple Topical groups within a frontier
  - Yes, though the current form only permits you to select two topics. Don't sweat this too much.